8 Homestake User Support and Environment

To an extent that will pleasantly surprise many, Lead, South Dakota is an accessible and appealing location for a national laboratory.

It is located in the beautiful Black Hills, an ancient mountain range that is host to Mount Rushmore, Crazy Horse National Memorial, the Black Hills National Forest, popular resorts, pristine mountain lakes and thriving communities which provide amenities that continue to attract upscale in-migration from overcrowded coastal areas and cities.

Artists, celebrities, entrepreneurs, young retirees and wealthy people are included in that in-migration, drawn by scenic, educational, cultural, and recreational assets. Within minutes of the Homestake site, lab personnel and visitors will find what they need to make their stay productive and enjoyable. The Black Hills offer the ideal location for workshops, lecture series, field camps, and collaboration meetings due to the availability of inexpensive lodging and meeting spaces.

The environment is conducive to energized, productive work because of the facilities and amenities available, a modern cyberinfrastructure, and a community known for its friendliness and demonstrated commitment to the success of the laboratory and its users.

In this section we will highlight the major needs of a user at this facility, including transportation, housing, dining, health care, schools, recreation, the arts, science-related community organizations, religious organizations, institutions of higher learning, cyberinfrastructure, computer support (including service, sales, programming and maintenance), libraries, and a labor pool skilled in electronics, computer, and machining/fabrication industries.

8.1 Homestake User Liaison Office and Users' Support

The laboratory staffing plans describe three groups of particular importance to users of the Homestake facility. Within the Science and Engineering Research Program is a *User Liaison* whose primary purpose is to interface with users and to guide them through all aspects of performing research at the Homestake site. This position will grow to two FTE by FY16. Within the *Education and Outreach Group* are the training, public outreach and relations and visitor center functions, in addition to traditional education and regional university partnership functions. The Education and Outreach office will be staffed with 11 FTE, including administrative support, by the end of the construction phase and throughout the operations phase.

The *Facility Operations and Site Services Office* will handle most of the liaison functions required by facility users. This office will provide training support, EH&S training and assistance, housing and transportation support, shipping, receiving, shops and trades assistance, computing assistance, preparation for and transportation to underground facilities, user housing, human resources, and business operations. This office also includes the critical Environmental, Health and Safety functions. It will be staffed by 62 FTE by the start of DUSEL operations.

8.2 Visitor Center, Dining Facility, Housing

The $70M donation by Mr. T. Denny Sanford to the South Dakota Science and Technology Authority (The Authority) includes $20M for the creation of a visitor center and a revolutionary new education and outreach facility, to be known as the Sanford Center for Science Education. The Authority anticipates spending approximately $1.5M of its own resources to support those components. The visitor center is to include hands-on interactive science exhibits, a restaurant,

and a gift shop. The Sanford Center for Science Education will be housed in an existing 25,000 square foot building on the Authority's property. A second level in this building will be added. This facility will contain on-campus housing for students, video/animation production facilities for educational programming, multi-media transmission capabilities for distance learning, and conference facilities including meeting rooms, a small theater, classrooms and laboratories. Dining facilities (cafeteria, snack bar and private dining rooms) for students, staff and visitors will be included and will serve as the cafeteria for the DUSEL. It is anticipated that ~$3M of the gift will be used to help support operations of the education center through 2012. This funding may also be used to support utility and other occupancy and infrastructure expenses of the center. Plans call for this project to commence in 2008 and to be completed in 2009.

For those interested in housing off the laboratory campus, a review of the rental property market in the Lead/Deadwood and Spearfish areas indicates one, two and three bedroom apartments and homes are available in Lead/Deadwood. Two and three bedroom apartments, duplexes and townhouses, including furnished units, are available in Spearfish. The pace of residential development in the Black Hills area strongly indicates the presence of well-capitalized, experienced, and competitive developers who are readily able to meet growing demands for housing required by the lab and associated organizations. Public opinion surveys of the area consistently find overwhelming support for continued growth.

8.3 Cyberinfrastructure at Homestake

State-of-the-art broadband Internet connectivity to research institutions throughout the United States and the world is essential for DUSEL. This cyberinfrastructure will encourage and support communications and the free dissemination and distribution of data obtained from the Homestake experiments, endorsing the Homestake DUSEL as a world-class research facility and link South Dakota with the national high speed Internet backbone. The Governor's office is committed to establishing high speed broadband connectivity in the state.

The South Dakota Board of Regents, which oversees South Dakota's six Regental universities, has proposed to the Governor's office a plan developed with a national consultant to connect the major research institutions in the state with the backbone necessary to support gigabyte transmissions (see Appendix A22). This plan has been developed with other states as part of the Northern Tier Network Consortium. The plan outlines establishing high speed broadband connectivity from the North Dakota border near Fargo south to the major hub in Kansas City. Within South Dakota (Figure 8.1), the GB fiber, with 100 GB future capabilities, would connect Kansas City to Sioux Falls, west through Pierre and Rapid City, thence to Lead (Homestake site).

The network provides critical cyberinfrastructure connecting the universities (University of South Dakota, South Dakota State University, Northern State University, Dakota State University, South Dakota Schools of Mines and Technology, and Black Hills State University) and major research institutions in the state (United States Geological Survey EROS data center, South Dakota Public Universities Research Center, Graduate Research and Education Center and Homestake DUSEL).

The plan extends the GB fiber to DUSEL as part of the over 1100 miles of network backbone

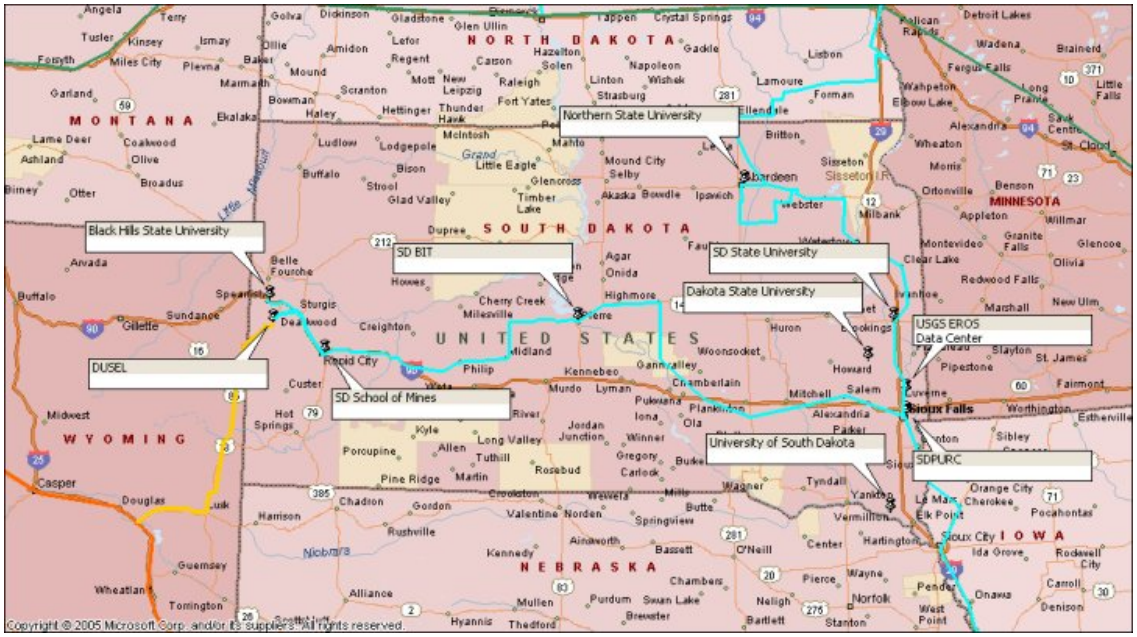

Figure 8.1 Proposed GB backbone connecting Homestake to the Kansas City Hub and the Northern Tier Network Consortium.

fiber already in place in the state with, a 20-year right-to-use of the network. At the Homestake facility, fiber would be installed from the surface down to all research levels providing seamless connectivity to researchers across the United States and throughout the world. The initial engineering proposals for providing underground connectivity are presented in the Dynatec Rehabilitation Study of 2005. To prepare for the growing needs for connectivity, the staffing plan includes 3 to 4 information technology staff.

As an example of the use of cyberinfrastructure for work similar in nature, several large, complex physics detectors have demonstrated that, with adequate connectivity, the experiments can successfully be monitored and operated remotely. These experiments include the KamLAND experiment in Japan with experimental shifts being taken in the United States, the Sudbury Neutrino Observatory with remote shifts taken from Laurentian University, and the MINOS experiment at Soudan, with shifts being taken at Fermilab. Naturally, there exists a need for local operators to respond to some critical situations, but much of the routine operation for many of Homestake's experiments would be handled remotely. These experiments also provide a good model for understanding the volume of data, the speed of transmission necessary and remote handling of data that will be required by the experiments at Homestake DUSEL.

At Homestake DUSEL we envision developing a local computer "farm" to store and distribute data. With time and growing uses, we envision the development of substantial support for users beyond these basic operations. The Homestake site has opened discussions with the National Center for Atmospheric Research to investigate potential collaboration and participation by DUSEL in the NCAR data storage, data distribution and geocollaboration efforts.

A cyberinfrastructure proposal will be submitted to NSF through the EPSCoR office requesting support in obtaining fiber connectivity from Rapid City South Dakota to DUSEL, and the first year of operating costs. The NSF cyberinfrastructure proposal requests $670k for a one-time cost for fiber connectivity from Rapid City to Lead (55 miles) and $127k for the first year of

operating costs. The state of South Dakota will be expected to provide connectivity from Rapid City to the national grid.

In addition to cyberinfrastructure at Homestake DUSEL, the local universities in Rapid City and Spearfish have IT and computer support departments and research libraries.

8.4 Regional University Participation in Homestake DUSEL

The Authority is working to ensure that South Dakota's universities, neighboring EPSCoR programs and other regional universities recognize the opportunities for research, education and outreach associated with a successful DUSEL at Homestake. The Authority has appointed Dr. Daniel O. Farrington, formerly the System Vice President of Research for the South Dakota Board of Regents, as Regional University Liaison Officer to assist with this effort.

Regional universities submitted a number of "Letters of Interest" for research, education, and outreach projects at Homestake DUSEL. The Authority is working with the DUSEL Homestake Principal Investigators to ensure that as many collaborators from regional universities as possible can be legitimately and professionally integrated into the proposed initial suite of experiments and education and outreach activities.

In order to capitalize on these regional expressions of interest in deep underground research, a workshop for neighboring EPSCoR state research executives was held on October 20, 2006 at the Homestake site. The workshop was very successful in helping to develop a strategy and roadmap for regional participation in the DUSEL activities. This was particularly important in the EPSCoR states banding together to advance the goals of each institution and the DUSEL. There was a consensus that future workshops on long span excavation, safety, physics, K-12 outreach, and undergraduate and graduate education and outreach would be especially valuable in building the necessary collaborations.

In order to advance the research goals of the state and the DUSEL, the South Dakota Board of Regents is encouraging the research universities (South Dakota School of Mines and Technology, South Dakota State University, University of South Dakota) to actively work together in new and innovative ways to develop a physics doctoral program within the state.

Given the wealth of scientific, engineering, and education possibilities, formalization of a well-defined organizational structure designed to promote the cooperation on a regional basis is highly desirable. The Great Plains Collaboration (GPC), which currently consists of contacts from four of the surrounding NSF EPSCoR states, is a direct result of this organizational activity. The collaboration focuses on a group of "centers of excellence," defined as major research activities encompassing a range of related scientific directions.

These "centers" are seen as being dynamic constructs that are sufficiently agile to be formed and modified as the scientific directions warrant. As a result of meetings and contacts at all levels in the regional university structure, four potential "centers of excellence" were identified at this stage of the Homestake DUSEL. Recognizing that technology transfer and building of research capacity has been termed a "contact sport," the Collaboration promotes a philosophy of facilitating interaction among the research interests within South Dakota, the region, and the nation. Ideally, cooperative projects will be "regionally grounded"; that is research capabilities from the region can be used to augment, facilitate and conceive projects in concert with external researchers. As a result, improvements in the critical mass of faculty and students from South

Dakota and regional universities can be accomplished, which will result in increased support for programs supported by federal agencies and private industry.

The centers identified thus far would be Mining Resources, Earth Sciences and Engineering, Microbial Ecology and Bio-prospecting, Cloud and Weather Science and Modeling and an ultra-low background counting facility. These centers provide examples of the breadth of possibilities, as the first two represent areas of research that can potentially support ongoing operational activities at the laboratory, whereas the second two represent research opportunities that exploit the unique features of the underground laboratory. For partners external to the region, th establishment of the centers will provide a specific contact that can facilitate projects and potentially provide a venue for interaction with the resources of the region. Within the centers, subgroups interested in specific projects will find fertile ground for nourishing the cooperative efforts that can promote interactions that will help both the quality of the scientific enterprise and improve the regional capabilities in science and engineering.

8.5 General Accessibility

Homestake DUSEL will be a dedicated facility continuously accessible at all times during the year. It will be uncompromised by competing activities such as mining or transportation that impede access in other facilities. Redundant conveyances will ensure safe and continuous access to the underground even during preventative maintenance and service periods.

Current plans include installing a new automated personnel lift providing access from the surface to the 4850 Level and refurbishing the main conveyances in the Ross and Yates shafts to support material and equipment transport. We are examining plans to convert the lifts into a “super” lifts to provide a substantially larger lifting footprint. Redundant power feeds from the surface will ensure continuous, uncompromised power and communications. Title to the entire 186 acre surface facility and the entire underground site is held by the Authority, which will provide assurance of at least 30 years of access to the site. Access to the underground will not be influenced by future mining activity or changes of ownership. The Homestake site is accessible via the Rapid City airport (which is served by multiple air carriers from Denver, Chicago, and Salt Lake City) and by interstate highways and major rail lines. The site is a ~ 40 mile drive from Rapid City. Within 50 miles of the mine there are three communities, including Lead, providing all essential services: housing, medical, education, recreation, food, etc. There are collaborating universities in Rapid City and Spearfish.

As the premier underground research facility access will be assured to all researchers, regardless of nationality, with appropriate training and conformance to facility procedures (such as workers compensation insurance coverage, etc.). Homestake DUSEL will fully conform to NSF policies concerning classified and proprietary research. The vast Homestake site can provide segregated sites and isolated facilities for Homeland Security applications that require isolation without impacting other research efforts.

8.6 Transportation and Access

Lead (population ~3,027) is conveniently situated in the northern Black Hills with easy access on a well maintained highway system to surrounding communities and to the regional airport in Rapid City. Lead is approximately an hour’s drive from Rapid City (population ~ 88,500 in metropolitan area) and its airport, less than half an hour from Spearfish (population ~8,600), home of Black Hills University, one half hour from Sturgis (population ~6,476), site of the

internationally famous motorcycle rally that draws more than half a million visitors for a week every August, and a little over one hour from Hill City (population ~861), a small sawmill and tourist town that has been transformed into a thriving arts community. Lead is adjacent to the historic city of Deadwood (population ~1,300). Rapid City and the surrounding communities are known as the Banana Belt of South Dakota for the characteristically mild winters that are much gentler than those in the "blizzard alley," hundreds of miles to the east on the open prairie, whose meteorological reputation is unfairly and unfortunately often confused with that of the Black Hills. Even though Rapid City and the surrounding communities located at higher elevations, such as Deadwood and Lead, receive considerable amounts of snowfall, temperatures rebound after a snowfall and sunny skies generally prevail.

January and February daytime temperatures can average in the 30s; however, temperatures will quickly approach the 50s and 60s due to the Chinook winds. Temperature inversions can result in warmer weather in the higher elevations of the Black Hills than in Rapid City. Arctic air intrusions come and go quickly. January and February monthly snowfall averages five inches in Rapid City and fifteen inches in other areas of the Black Hills. The snow often melts quickly in the foothills and plains, while the deeper snow remains at the higher elevations, a boon for outdoor recreational activities. July and August are sunny and dry. Temperatures generally climb into the 80s and 90s yet the humidity is low and the winds are breezy. Low temperatures at the higher elevations can be in the 40s and even the 30s during a typical summer evening.

8.6.1 Travel Time to the Homestake Site

Travel from most major U.S. airports across the country to the Homestake site in Lead can be completed in six and one half hours or less. Interstate highways and well maintained state highways allow for comfortable and efficient motor vehicle travel from all directions into Lead.

8.6.1.1 Air Service

Rapid City Regional Airport experiences an average of only one day of closure per year due to inclement weather.

Travel time from Rapid City Regional Airport to Lead is about one hour on the interstate highway for all but the final seventeen miles, which are a new four lane state highway.

Rapid City Regional Airport is served by four airlines with hub connections to Minneapolis (NWA), Salt Lake City (DELTA), Las Vegas (Allegiant), Denver and Chicago (United). Flight times from major cities to Rapid City, including layovers are listed in Table 8.1.

The Rapid City Air Task Force and the Rapid City Regional Airport administrators are continually working to increase the number of carriers and flights in and out of Rapid City. Members of the Air Task Force are keenly aware of the Homestake project and the need for convenient and affordable air service for all the parties involved with the project now and in the future. Their efforts have paid off in recent months, as evidenced by the following data.

Number of Flights Per Day to Rapid City

- United Express/Denver: 7 flights per day
- United Express/Chicago: 1 per day during peak season (The Black Hills Air Service Task Force is currently negotiating adding two Chicago/Rapid City direct flights per day on a year around basis.)

- Northwest/Minneapolis: 3 per day, with additional flights added during peak season in the summer
- Sky West Delta connection /Salt Lake City: 3 per day Delta (Delta Airlines and airport officials are discussing adding direct flights between Rapid City and Cincinnati or Atlanta.)
- Allegiant Air/ Las Vegas: 2 times per week nonstop - Wednesdays and Saturdays (Will change to Fridays and Mondays beginning February 9, 2007.)

Number of Flights Per Day from Rapid City

- United Express/Denver: 7 flights per day
- United Express/Chicago: 1 flight per day during peak season
- Northwest/Minneapolis: 3 flights per day
- Sky West Delta connection/Salt Lake City: 3 flights per day
- Allegiant Air/Las Vegas: 2 times per week nonstop - Wednesdays and Saturdays (Will change to Fridays and Mondays beginning February 9, 2007.)

Table 8.1 Travel times to Homestake site from Selected Cities

Travel from City	Air and Drive Times	Total Travel Time (1 way)
Albuquerque	3.5 hours (includes 1 hour layover in Denver) plus 1 hour drive to Lead	4.5 hours
Atlanta	5.5 hours (includes 1 hour layover Minneapolis) plus 1 hour drive to Lead	6.5 hours
Boston	5.5 hours (includes1 hour layover Minneapolis) plus 1 hour drive to Lead	6.5 hours
Dallas	4.5 hours (includes hour layover Denver) plus 1 hour drive to Lead	5.5 hours
Chicago Option #1	4.5 hours (includes1 hour layover Minneapolis) via Northwest plus 1 hour drive to Lead	5.5 hours
Chicago Option #2	2.5 hours direct via United plus 1 hour drive to Lead	3.5 hours
Knoxville Option #1	8 hours (includes 3 hour layover Denver) via United plus 1 hour drive to Lead	9 hours
Knoxville Option #2	8.5 hours (includes 2 hour layover Memphis, 1 hour Minneapolis) via Northwest plus 1 hour drive to Lead	9.5 hours

Travel from City	Air and Drive Times	Total Travel Time (1 way)
Los Angeles - LAX	5.5 hours (includes .75 hour layover Denver) plus 1 hour drive to Lead	6.5 total
New York, LaGuardia Airport	5.5 hours (includes 1 hour layover Minneapolis) plus 1 hour drive to Lead	6.5 hours
Philadelphia	5.5 hour (includes 1 hour layover Minneapolis) plus 1 hour drive to Lead	6.5 hours
San Francisco	3.5 hours (includes 30 minute layover Salt Lake City) plus 1 hour drive to Lead	4.5 hours
Washington DC, Reagan Nat'l Airport	5 hours (includes 1 hour layover Minneapolis) plus 1 hour drive to Lead	6 hours

These travel times compare very favorably to travel times associated with current and proposed underground sites as seen in the following chart.

Table 8.2 Travel times from San Francisco to current and proposed underground sites.

Laboratory Site	Air and Drive Times	Total Travel Time (1 way)
Toyama, Japan	10 hour flight, 2 hour bus, 2 hour layover, l hour flight, 1 hour drive	16 hours
Sudbury, Canada	5 hour flight, 1 hour layover, 1 hour flight, 45 minute drive	7.75 hours
Gran Sasso, Italy	11 hour flight to Heathrow, 3 hour layover, 3 hour flight to Rome, 2 hour drive	19 hours
Empire, Colorado	2 hour flight, 1 hour drive	3 hours

8.6.1.2 Rental Cars

Four rental car agencies serve Rapid City Regional Airport. Long term car rental arrangements can be made to provide guaranteed availability, and in some instances, parking spots in the rental lot just a few feet from the door of the terminal building can be assured and the car heated in anticipation of renter's arrival based upon outdoor temperature.

8.6.1.3 Highway System

There is an excellent road system to and from the airport to Lead, as well as throughout the Black Hills, including high quality city, county, state and interstate highways. Travel time between Denver and Lead (389 miles) is 8 hours. Travel time between Minneapolis and Lead (649 miles) is 10.75 hours. A four lane connector highway is under construction to link Rapid City, South Dakota and Denver, Colorado.

8.6.1.4 Charter and Tour Buses

The charter and tour bus industry places organized visitation within accessible reach for student groups in a 1,000 mile radius from Lead. For example, transport by motor coach and seven nights lodging (double occupancy) for 45 passengers from Chicago to Lead during the "shoulder months" of March through May and September through November is approximately $480 per person.

8.7 Hospitals and Health Care

The Black Hills communities (Rapid City, in particular, which has more than 200 physicians and surgeons) have exemplary medical personnel, facilities and services, including specialty clinics such as cardiology, endocrinology and dermatology. Community health facilities serve a wide area, including South Dakota and parts of North Dakota, Montana, Wyoming and Nebraska.

8.7.1 Black Hills Community Health Services

8.7.1.1 Lead-Deadwood

The Lead-Deadwood Hospital offers a comprehensive range of medical, diagnostic and surgical services including intensive care, emergency room services, rehabilitation and therapeutic programs.

8.7.1.2 Rapid City

Rapid City Regional Hospital has 310 beds and 2,291 employees and emergency helicopter service. There are three surgery centers in Rapid City. The John T. Vucurevich Cancer Care Institute provides inpatient and outpatient medical and radiation oncology services and clinical trial research service.

Rapid City Regional Hospital is staffed with emergency medicine physicians and nurses who are certified in Advanced Cardiac Life Support. The staff is trained to provide a full range of medical care for all ages from minor illnesses to life-threatening emergencies. In addition, physician specialists provide on-call coverage 24-hours a day to respond to medical emergencies.

The Rapid City Regional Hospital ER team provides services to persons within a 250-mile radius of Rapid City.

Rapid City Regional Hospital provides access to the best specialists from a wide range of specialties, including:

- Trauma and emergency surgery
- Emergency medicine
- Orthopedic surgery
- Neurosurgery
- Spine Surgery
- Vascular Surgery
- Interventional Radiology
- Comprehensive rehabilitation

8.7.1.3 Spearfish

The Spearfish Regional Hospital and the Family Medical Center Clinic are centralized in one location. Twenty four hour emergency care is available. Services include onsite laboratory and pharmacy, the Woman's Health Care Center, Home Care and Hospice program.

8.7.1.4 Sturgis

Under the umbrella of the Rapid City Regional Hospital system, the Sturgis Regional Hospital contains a 25-bed Critical Access Hospital, an 84-bed Medicare-certified nursing home, a Medicare-certified home health agency, and a specialty clinic for visiting physicians. The hospital offers a comprehensive range of medical, diagnostic, and surgical services including intensive care, obstetrics, rehabilitation, and therapeutic programs, as well as 24 hour a day emergency care. The Specialty Clinic draws 9 Specialists to the facility. The nursing home includes skilled, intermediate, and special care beds.

8.7.1.5 Trauma Centers and Emergency Care Response

8.7.1.5.1 Trauma Levels

Level I: Provides the highest level of care for patients with complex injuries, having emergency physicians, nurses and surgeons immediately available.

- To be a verified trauma center often means the hospital is a teaching hospital with specialized residencies.

Level II: Provides treatment for complex and severe trauma patients with emergency physicians and nurses in-house and surgeons available upon patient arrival. These centers offer a broad range of specialists, diagnostic capabilities and support equipment.

Level III: Provides stabilization to the trauma patient, with emergency physicians and nurses immediately available and surgeons without specialization located within in 20 minutes.

8.7.1.5.2 SDSTA on Site

- There is a person trained in first aid on site during every shift.
- Annual training is provided for First Aid, CPR, and AED.
- Key personnel will be trained as First Responders.

8.7.1.5.3 Lead-Deadwood Regional Hospital and Rapid City Regional Hospital

The Lead-Deadwood Regional Hospital is a Level III trauma center located three miles from the Homestake site providing 24-hour emergency and ambulance services with an 18 bed facility for inpatient care. This hospital also offers a comprehensive range of medical, diagnostic and surgical services including:

- Intensive/Coronary Care Unit
- Inpatient/Outpatient Surgery
- Radiology
- Laboratory
- Respiratory Care

- Physical Therapy
- Cardiac and Pulmonary Rehabilitation
- Durable Medical Equipment Services

Rapid City Regional Hospital functions as a Level II trauma center, located 45 miles east of the Homestake site. Specialized physicians are on call 24 hours and are located within 20 minutes of the hospital. Once a major trauma is known, the required specialized physicians are often alerted to the situation and are in-house when the patient arrives.

8.7.1.5.4 Black Hills Life Flight

- Black Hills Life Flight is a fully integrated medical transport team offering rapid access to emergency rotor wing (helicopter), fixed wing (airplane), and critical care ground transportation.
- The Black Hills Life Flight team has the highest level of training and certifications and has the most up-to-date equipment available to respond to most emergency situations. Black Hills Life Flight works closely with Rapid City Regional Hospital Emergency Department and physicians to ensure the highest quality of patient care.
- The Life Flight response time to the Homestake site is 20 minutes.
- The Black Hills Life Flight provides transportation from the Rapid City Regional Hospital to other specialized patient care areas in the surrounding states. (Wyoming, Minneapolis, Nebraska, Iowa, and Colorado are a few of the states that a patient may be transferred to depending on the patient's need).

8.7.2 Veterans Services

The Black Hills is a premiere location for military retirees from around the country, especially those who have served at Ellsworth Air Force Base near Rapid City. These individuals have, in many cases, served at bases around the world and have chosen the Black Hills as their retirement home. Currently 4,505 United States Air Force retirees live in the Black Hills. Comprehensive services and medical care are offered to veterans. The Veterans Administration Black Hills Health Care System is located at Fort Meade, near Sturgis and approximately a thirty minute drive time from Lead. This facility provides primary and secondary medical and surgical care, along with residential rehabilitation treatment program services, extended nursing home care and tertiary psychiatric inpatient care services. There are sharing arrangements with Ellsworth Air Force Base, South Dakota Army National Guard, and other community partners.

8.7.3 Children's Care and Rehabilitation/ Rehabilitation Supply

The Children's Care Rehabilitation and Development Center in Rapid City helps children with special challenges from mild to severe. Staff members are trained in special education, psychology, and challenging behaviors. There are family-centered programs on an outpatient and outreach basis. Children's Care offers developmental screenings, consultation, and programs to enhance the normal development of children from birth through school age. Outreach is supported by a subsidy from the Children's Care Foundation, financial support from the South Dakota Elks Association and the Scottish Rite Foundation.

The Center houses Rehabilitation Medical Supply a full-service medical equipment supplier. Its staff members have the expertise to provide independence for people with limited mobility.

8.8 Educational Institutions

8.8.1 Schools, Elementary and Secondary

See Appendix A23 for a discussion on the local elementary and secondary schools in the area.

8.8.2 Higher Education

Associate, baccalaureate, masters and doctoral degrees are available through the West River Higher Education Center in Rapid City. Doctoral degrees are offered in Atmospheric, Environmental and Water Resources; Geology and Geological Engineering; and Materials Engineering and Science.

8.8.2.1 South Dakota School of Mines and Technology

The South Dakota School of Mines and Technology (SDSM&T) is a state university founded in 1885 providing undergraduate and graduate degrees in science, engineering and interdisciplinary sciences. SDSM&T has approximately 2,100 traditional and non-traditional students from 39 states and 31 countries. Of special note is a mining collection with many items related to the Black Hills mining industry and the Homestake site. SDSM&T is the host institution for the Black Hills Natural Science Field Station, a cooperative program formed by a consortium of colleges offering field courses in geology and geological engineering programs. SDSM&T partners with tribal colleges and universities in the region in order to increase degree offerings and transfer opportunities for students enrolled at these institutions, which include Oglala Lakota College and Sinte Gleska University.

The school's Advanced Materials Processing and Joining Laboratory provides research and development opportunities. It has three-dimensional friction stir processing equipment that provides the capability to join large, curvilinear structures in ferrous and non-ferrous alloys directly from CAD/CAM files. On-going projects involve the engineering programs at SDSM&T and other academic institutions, government laboratories and industrial partners.

8.8.2.2 Black Hills State University

Black Hills State University (BHSU) in nearby Spearfish has 3,896 enrolled students and is the home to one of eight Centers of Excellence at universities throughout the South Dakota Board of Regents system. BHSU's Center of Excellence is the Center for the Advancement of Mathematics and Science Education (CAMSE). CAMSE's mission is to support the teaching and learning of math and science from kindergarten through college and beyond. CAMSE's mission is consistent with the vision for education and outreach to be associated with Homestake DUSEL. BHSU will assume a leadership role in the Homestake Interim Laboratory and DUSEL activities.

8.8.2.3 National American University

National American University (NAU) is a private, regionally-accredited, multi-campus institution of higher learning with the central campus located in Rapid City. The university provides career and professional undergraduate and graduate programs on campus and through distance delivery. It is accredited by the Higher Learning Commission and is a member of the

North Central Association. It offers a Master of Business Administration, Bachelor of Science and Associate of Applied Science degrees. It is affiliated with Human International Universities and Colleges Consortium, Japan; Augustana College, Kenya; Universidad del Mar, Chile; Skyline College, United Arab Emirates and Skyline Business School.

8.8.2.4 Oglala Lakota College

Oglala Lakota College is located approximately two hours from Lead and is one of the first tribal colleges in the United States. The college was chartered by the Oglala Sioux tribe to provide educational opportunities that enhance Lakota life. The college awards associate, bachelors, and graduate degrees. Areas of study include Agriculture and Natural Resource Development, Education, Math and Science, and Lakota Studies. The institution has college centers in various communities on the Pine Ridge Reservation. Enrollment is 1,400, with a full-time equivalency of 900 students. It is a North Central accredited institution.

8.8.2.5 Sinte Gleska University

Founded in 1971, Sinte Gleska University is named in honor of a Lakota warrior chief. The university is located nearly three hours from Lead on the Rosebud Indian Reservation. In addition to certificates and associate's degrees, bachelor's degrees are offered in arts and science, education, business administration and Lakota Studies. The overall academic goal of the Lakota Studies Department is to integrate traditional Lakota values and history in a bi-cultural setting that meets the challenges and complexities of Lakota society. A master's degree is available in Human Services.

8.8.2.6 Western Dakota Tech

Western Dakota Tech (WDT) provides technical education. One of four state-supported postsecondary technical institutes in South Dakota, WDT offers twenty five career programs ranging in length from 9 to 18 months. Western Dakota Tech grants Associate of Applied Science degrees and diplomas upon completion of individual program requirements. Through WDT's Corporate Education Center, a wide variety of non-credit classes, workshops, and short-term training programs are available. WDT serves more than 4,000 students each year through full and part-time enrollment and non-credit courses. Currently 850 students are enrolled full-time students. Courses are available days, evenings, weekends and on-line.

Of particular interest to the Homestake project is the welding program, which has 80 machines, 62 students currently enrolled, and six instructors. The program has room for 40 new students a year. According to a November 12, 2006 article in the *Rapid City Journal*, the school is considering incorporating more mining technology into its programs. WDT has already combined machining and drafting into the welding program to give students a solid background in industrial welding.

8.9 Recreation

The distance to Lead may cause some scientists, faculty and students to plan fewer but longer trips, which gives rise to questions about the social environment they might encounter on a longer stay. Such concerns are easily allayed. Lead is in the beautiful Black Hills of South Dakota, a major national and international tourist destination. Main attractions include **six** national parks, monuments and memorials: Mount Rushmore National Memorial, Devil's Tower National Monument, Badlands National Park, Jewel Cave National Monument, Wind Cave

National Park and Crazy Horse Memorial. Except the Badlands, all are located within the 1.2 million acre Black Hills National Forest.

Because of these national assets, a major share of the region's economy and infrastructure is devoted to hosting visitors from around the nation and around the world. The Black Hills tourism industry aggressively markets to European and Asian travelers.

Because of its unique, anthropological, geological, paleontological, archaeological and natural attributes, the Black Hills has played host to countless university expeditions for more than a century. The communities are well aware of the scientific interest in this area, and billboards and signs have been seen to sprout "Welcome Scientists" messages in recent years. We present in Appendix A23 many additional details about recreation, fine arts, and additional aspects of what users can expect when they come to work, study, or visit the Homestake site.

8.10 Facilities, Computers, Libraries

Two state universities, a technical institute, a private university and two tribal colleges offer a wide variety of instruction including degrees and certifications. They also have computer training/laboratories and libraries, many of which are open to the public.

The Devereaux Library on the campus of the South Dakota School of Mines and Technology is open to members of the community.

At the South Dakota School of Mines and Technology the Information Technology Services (ITS) operates and maintains the school's centralized computing resources, the campus Local Area Network and gateways to external wide-area networks, including the state telecommunications network. SDSM&T is a participant in Internet2 and is connected to the Abilene Network through the Great Plains Network.

The E.Y. Berry Library-Learning Center located on the campus of the Black Hills State University is a major resource center available to the community. The facility houses more than 235,000 books and 70,000 government documents. Included is the unique Cox Collection of state, county and local histories spanning from middle of the 19th century through World War II.

The library collection can be searched and accessed using the South Dakota Library Network (SDLN) South Dakota Library Network (SDLN) that the Black Hills State University pioneered for the State of South Dakota. Technical Support Services (TSS) provides computer and network technical support for faculty, staff and students for all university-related business. TSS maintains faculty and staff computers for office use as well as student use lab computers.

In 1996, former Governor Bill Janklow, understood the need for South Dakota's students to compete in a global economy and thus initiated a program to wire each of the schools in the state's 176 school districts for high speed internet access.

8.10.1 Computer Expertise

In order to support the amenities and institutions described throughout this section, the Black Hills region attracts and generates a large population of individuals with expertise in computer programming, software development, systems design and manufacturing. (Detail provided in the labor market summary.) Of particular note is the Sanmina-SCI Corporation, a leading electronic manufacturing services provider that has owned and operated a facility in Rapid City for 35 years. The Sanmina-SCI Corporate plant specializes in assembling printed circuit boards and

final systems. The Sanmina-SCI Corporation helps clients introduce new products to market, provide low-volume manufacturing runs, integrate systems, test products, manage the supply chain, deliver product directly to the customer and provide repair service.

8.10.2 Municipal Libraries

Lead's Phoebe Apperson Hearst Lead Library is located on Main Street. The original library, the Hearst Free Library and Reading Room, was a gift to the City of Lead and its citizens by T.J. Grier, Superintendent of the Homestake Mine at that time, on behalf of Phoebe Apperson Hearst on Christmas Day, 1894. The library's original collection had many foreign language books to accommodate the reading interests of the various ethnic groups that made up the population of Lead. Some of these books are still available in the George Hearst Research Room. The City of Lead provides facility and building maintenance and the Lawrence County government and private donations fund the library's operations. The library participates in the shared automation system provided by the South Dakota Library Network consortium.

Neighboring Deadwood, Hill City, Spearfish (the Grace Balloch Memorial Library), Sturgis and Rapid City also have libraries. The Rapid City Public Library has 100,248 books, 5,739 audio materials, 5,493 video materials and several hundred serial subscriptions.

8.11 Labor Market

Table 8.3 summarizes relevant employment within a ~ 340 mile radius of Rapid City.

Table 8.3 Firms and Employees within a 340 mile radius of Rapid City.

Industry Segment	Firms	Employees	Relevant Categories
Machinery, Machining & Fabrication	192	13,598	die casting /extrusion, electroplating/plating, fabricated metals-pipes and plate, industrial machinery: pumps and valves, machining and machine tools, and power transmission
Electronics, Instruments& Computing	101	6,610	computer integrated systems designs, custom programming, software development, industrial instruments and electronic systems
Transportation Equipment& Repair	28	1,275	aircraft body, wing assemblies, repair, parts auto body, electrical and hardware